

1470 **WHAT IS CLAIMED IS:**

1. A means for the implementation of new fast algorithms for complex Walsh orthogonal CDMA encoding and decoding of multiple data rate users over a CDMA frequency band with properties

1475 provide a complex Walsh orthogonal code with the real component equal to the real Walsh orthogonal code, and with the imaginary component equal to a reordering of the real Walsh orthogonal code which makes the complex Walsh orthogonal code the correct complex version of the real Walsh orthogonal code to
1480 within arbitrary angle rotations and scale factors

provide complex Walsh orthogonal CDMA codes which reduce to the real Walsh orthogonal CDMA codes upon removal of the imaginary code components

1485 provide a means to encode and decode multiple data rate users with complex Walsh orthogonal codes for simultaneous transmission over the same CDMA frequency band with computationally efficient algorithm means to implement the encoding and decoding

1490 provide a computationally efficient algorithm means to encode and decode multiple data rate users with complex Walsh orthogonal codes with values ± 1 $\pm j$, for simultaneous transmission over the same CDMA frequency band

1495 2. A means for the implementation of new hybrid complex Walsh orthogonal CDMA encoding and decoding of multiple data rate users over a CDMA frequency band with properties

1500 provide a means for the construction of hybrid complex Walsh orthogonal CDMA codes which are functional combinations of the complex Walsh, discrete Fourier transform (DFT), Hadamard (real Walsh), and other orthogonal codes and which offer wider choices of code lengths

provide a means to extend the complex Walsh orthogonal CDMA codes to include the complex discrete Fourier transform (DFT) codes and other orthogonal codes to allow greater flexibility in the choices for the code lengths

1505 provide new fast algorithm means for the encoding and decoding of hybrid complex Walsh codes for multiple data rate users

3. A means for the design of hybrid complex Walsh orthogonal CDMA encoding and decoding of multiple data rate users
1510 over a CDMA frequency band with properties

provide a means to provide greater flexibility in the selection of the code length by combining the complex Walsh orthogonal CDMA codes with the complex DFT orthogonal CDMA codes as well as with other orthogonal codes

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1515 provide a Kronecker product means to combine the complex Walsh orthogonal CDMA codes with complex DFT orthogonal CDMA codes as well as with other orthogonal CDMA codes

provide a direct sum means to combine the complex Walsh orthogonal CDMA codes with complex DFT orthogonal CDMA codes as
1520 well as with other orthogonal CDMA codes

provide a functionality means to combine the complex Walsh orthogonal CDMA codes with complex DFT orthogonal CDMA codes as well as with other orthogonal CDMA codes

provide new fast algorithm means for the encoding and
1525 decoding of hybrid complex Walsh codes for multiple data rate users

4. A means to provide unconstrained flexibility in the selection of the code length by functional combining of appropriate orthogonal CDMA codes drawn from a set of code
1530 candidates that include the complex Walsh and the complex DFT

provide a functional means for the generation of orthogonal CDMA codes with unconstrained flexibility in the selection of the code length

provide a fast algorithm means for the encoding and
1535 decoding of CDMA codes designed with a functional means for the generation of orthogonal CDMA codes with unconstrained flexibility in the selection of the code length

provide a functional means for the generation of orthogonal
CDMA codes for multiple data rate users with unconstrained
1540 flexibility in the selection of the code length

provide a fast algorithm means for multiple data rate
encoding and decoding of orthogonal CDMA codes which are
generated by a functional means for multiple data rate users to
provide unconstrained flexibility in the selection of the code
1545 length

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